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# Projection of Eurasian snow cover by the middle and the end of 21st century

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By using gridded monthly observing snow cover data under $1^\circ \times 1^\circ$ spatial resolution for 1962−2012, this study examined the simulated variations of Eurasian snow depth for higher (RCP8.5) and lower (RCP2.6) green house gas (GHG) emission scenarios by the middle and the end of 21st century. The reliabilities of snow depth products from 5 selected models attending phase 5 of the Coupled Model Intercomparison Project (CMIP5) were first assessed. Four of the five models were aggregated for projection due to their smaller biases, higher correlations, and better consistency.

Undoubtedly, snow cover over Eurasia as a whole will get thinner and thinner no matter what scenarios. Under RCP2.6, the snow depth decreases slowly and the decreasing amounts are close to each other for the middle and the end of this century. However, under RCP8.5, the snow depth decreases significantly, especially for the second half of this century, and the decreasing amount by the end of this century will be almost twice as that by the middle of this century. Compared with the average in 1986−2005, annual mean snow depth for RCP2.6 and RCP8.5 will decrease by 0.78 cm and 1.33 cm by the middle of this century, and decrease 0.81 cm and 2.87 cm by the end of this century, respectively.

Spatially, the northeastern Eurasian will be the sole region with snow depth increasing, and the region suffer the severest decreases of snow depth will be the northern Europe. In case of higher GHG emissions, the amplitude of both increases and decreases are much higher by the end of this century, and at the same time, there are greater decreases in the northern Europe than increases in the northeastern Eurasia. However, for the lower GHG emissions, the amounts of both increases and decreases of snow depth are similar in the middle and the end of this century, which means emission reduction is crucial to the fate of Eurasian snow cover.

Key words: snow cover, projection, simulation, CMIP5, assessment, climate change